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Clinical management of non-occupational and occupational exposure to blood borne pathogens

- A Pocket Reference -

January 2013
(next review: July 2013)

STEP 1 TREAT EXPOSURE SITE & REPORT FOR ASSESSMENT

An individual who experiences an occupational or non-occupational exposure to blood borne pathogens needs to have immediate first aid treatment for any wound and a risk assessment for the likelihood of transmission of a pathogen.

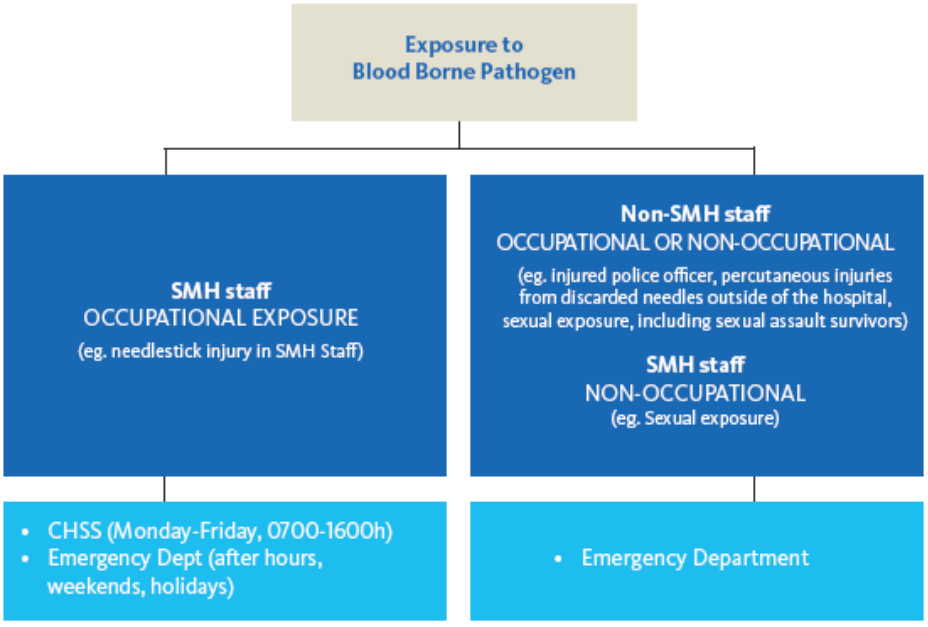
SMH staff with occupational exposures should immediately:

- Remove any contaminated clothing
- Allow wound to bleed freely
- Wash the area thoroughly with soap and water
- If exposed area involves the eyes, nose or mouth, thoroughly flush well with water
- Report the incident to his/her immediate supervisor and complete the Blood Borne Pathogen Exposure Report. If the source patient is known, it is important to record the source patient's full name and hospital number in the exposure report.
- Proceed **immediately** for risk assessment:
  - During Business Hours (Monday to Friday, 0700-1600h):
    - Corporate Health and Safety Services (2 Shuter, Ext 5013)
  - After hours, weekends, holidays:
    - Emergency Department

non-SMH staff with occupational exposures and all non-occupational exposures:

- should proceed immediately to the ED for treatment and assessment.

Algorithm for Presentation Following Exposure to a Blood Borne Pathogen



STEP 2 ASSESS THE EXPOSURE RISK

Many factors contribute to a significant exposure and a higher risk of transmission of a blood borne pathogen, including the type of body fluid involved, the type of injury that occurred, the size of the inoculum, and the attributes of the source patient. All of the following information should be obtained and recorded.

a. Body fluid: Body fluids considered potentially infectious include:

- blood
- plasma
- semen
- vaginal secretions
- cerebrospinal fluid
- synovial fluid
- pleural fluid
- peritoneal fluid
- pericardial fluid
- amniotic fluid

Body fluids NOT considered potentially infectious unless visibly bloody include:
(However: HBsAg is found in feces, nasopharyngeal washings, saliva and sweat)

- Feces
- nasal secretions
- saliva
- sputum
- sweat
- tears
- urine
- vomitus

b. Type of Injury/Exposure

- percutaneous - skin puncture or laceration by needle or sharp object
- mucosal - splash to mucous membranes (eg. eyes, nose, mouth)
- cutaneous - contact through nonintact skin (eg. cuts, dermatitis)

c. Inoculum size

- volume of infectious fluid involved (eg. hollow bore vs. solid needle; large volume vs small volume splash)
- viral titre in the infectious fluid if known (eg. well controlled disease vs. poorly controlled)

d. Source patient

- unknown HBV, HCV or HIV status
- positive for HBV, HCV, and/or HIV
- negative with risk factors (eg. men who have sex with men, multiple sexual partners, injection drug user, tattoo/body piercing, recipient of blood transfusion before 1986 for HIV or 1990 for HCV in Canada)
- negative with no risk factors

Estimated risk of transmission:

Following percutaneous exposure to blood or potentially infectious fluid:

- hepatitis B: 6-30%
- hepatitis C: 3-10%
- HIV: 0.3% (0.09% for mucous membrane exposure)

Estimated Per-Act Risk for Acquisition of HIV

Exposure route	Risk per 10,000 exposures to an infected source
Blood transfusion	9,000 (90%)
Needle-sharing injection-drug use	67 (0.67%)
Receptive anal intercourse	50 (0.5%)
Percutaneous needle stick	30 (0.3%)
Receptive penile-vaginal intercourse	10 (0.1%)
Insertive anal intercourse	6.5 (0.065%)
Insertive penile-vaginal intercourse	5 (0.05%)
Receptive oral intercourse	1 (0.01%)
Insertive oral intercourse	0.5 (0.005%)

STEP 3 ASSESS THE SOURCE & PERFORM BASELINE TESTING

Since serologic testing of the source patient for HBV, HCV and HIV is the most reliable method to assess the risk of exposure, this is strongly recommended. Ascertain if the exposed individual is willing to be tested for antibody to HBV, HCV and HIV. **If the exposed individual is not willing to be tested, do not test the source patient.**

Laboratory Testing of source patient:

If the source patient is KNOWN:

Test patient for HBsAg, HCV Ab, and HIV Ab

- Informed consent must be obtained
- If source is a neonate, testing should be done on mother
- If the source patient does not consent to testing and is at epidemiological risk for infection with HBV, HCV and/or HCV, follow the protocol for a positive source. However, an application can be made to the medical officer of health (MOH) requiring mandatory blood testing by the source patient if the exposure occurred while the SMH staff member was providing emergency health care services or emergency first aid to the source. The application process can be found at: http://www.health.gov.on.ca/english/providers/legislation/bill_105/105_mn.html

If the source patient is UNKNOWN or source cannot be tested:

Consider the likelihood of a bloodborne pathogen infection among patients in the exposure setting. eg. what is the community infection rate? Does the source have risk factors for infection?

BASELINE TESTING in exposed patient:

- Blood will be drawn for antibody to HBV, HCV and HIV
  - **If baseline testing in exposed patient is POSITIVE:**
  - Give appropriate counseling, encourage medical referral, and follow appropriate hospital policies if patient is SMH staff
  - **If baseline testing in exposed patient is NEGATIVE and:**

The source test result is negative:

- no further action is usually necessary; however, the individual should be counseled about the possibility that a high-risk source may be in the "window period" of acute infection. If that is a strong possibility, further follow-up serology may be recommended in consultation with the physician.
- the individual should initiate the 3-dose vaccine for hepatitis B if not already immune.

The source test result is positive:

- follow the procedure for HBV, HCV and/or HIV exposure

The source test result is unknown:

- follow the procedure for HBV, HCV and/or HIV exposure

- Consider testing for pregnancy and sexually transmitted infections (eg. gonorrhea, chlamydia, syphilis) as clinically indicated

STEP 4a PEP MANAGEMENT - HBV EXPOSURE

Management of potential hepatitis B exposure is dependent on the vaccination and antibody status of the exposed individual.

If the antibody status of the individual is unknown:

- immediately draw blood for anti-HBs (and label as "needlestick") prior to giving hepatitis B immune globulin or vaccine.

For an individual who is immune, no further action is required. An immune individual:

- has documented anti-HBs at any time after completing the hepatitis B vaccination
- has had natural exposure to hepatitis B and has HB core or HB surface antibodies

For an individual who is not immune, hepatitis B treatment and prophylaxis is required.
A non-immune individual:

- has never been vaccinated
- is a known non-responder to the hepatitis B vaccination series (ie. tested negative to anti HBs after two complete series of the hepatitis B vaccine)

Vaccination Status of Exposed	HBV Status of Source		
	HBsAg Negative	HBsAg Positive	Unknown
Unvaccinated			
Anti-HB Ab ≥10mIU/mL	No further action required	No further action required	No treatment required
Anti-HB Ab <10mIU/mL	Initiate vaccine series	HBIG x 1 Initiate vaccine series	If high risk exposure setting, treat as if source was HBsAg positive; otherwise, treat as if source was HBsAg negative
Vaccinated			
Anti-HB Ab ≥10mIU/mL (ever)	No further action required	No further action required	No treatment
Anti-HB Ab <10mIU/mL	**Completed 2 vaccine series** • No treatment **Completed 1 vaccine series** • initiate second vaccine series	**Completed 2 vaccine series** • HBIG x 1, repeat in 1 month **Completed 1 vaccine series** • HBIG x 1 • initiate second vaccine series	If high risk exposure setting, treat as if source was HBsAg positive; otherwise, treat as if source was HBsAg negative
Anti-HB Ab level unknown	Measure Anti-HB Ab level and if: **Anti-HB Ab ≥ 10mIU/mL** • No treatment **Anti-HB Ab < 10mIU/mL** Completed 2 vaccine series • No treatment Completed 1 vaccine series • initiate second vaccine series	Measure Anti-HB Ab level and if: **Anti-HB Ab ≥ 10mIU/mL** • No treatment **Anti-HB Ab < 10mIU/mL** Completed 2 vaccine series • HBIG x 1, repeat in 1 month Completed 1 vaccine series • HBIG x 1 • initiate second vaccine series	If high risk exposure setting, treat as if source was HBsAg positive; otherwise, treat as if source was HBsAg negative
Currently completing first vaccination series			
Received at least 2 doses	Complete vaccine series	Measure Anti-HB Ab level and administer 1 dose of vaccine If Ab < 10mIU/mL • HBIG x 1 • give final dose at time it would be due if infection has not occurred If Ab ≥ 10mIU/mL • complete vaccination series	If high risk exposure setting, treat as if source was HBsAg positive; otherwise, treat as if source was HBsAg negative
Only received 1 dose	Complete vaccine series	Measure Anti-HB Ab level and administer HBIG x 1 and 1 dose of vaccine If Ab < 10mIU/mL • retest in 4 weeks and complete vaccine series if infection has not occurred If Ab ≥ 10mIU/mL • complete vaccination series	If high risk exposure setting, treat as if source was HBsAg positive; otherwise, treat as if source was HBsAg negative

The treatment of an individual who is not immune may include one or both of the following:

a. Hepatitis B immune Globulin (HBIG)
When indicated, HBIG should be given as soon as possible, preferably within 24 hours after the exposure. Efficacy decreases substantially when it is given >48 hours post-exposure, and it is unlikely to be effective after 7 days. Dosage is given as 0.06 mL/kg body weight, to a maximum of 5 mL, administered intramuscularly equally at two administration sites. Dose should be repeated in one month in a known non-responder.

b. Hepatitis B vaccine series
A 3-dose series is indicated in the individual who has not been immunized. Doses should be administered at a site separate from HBIG if co-administered. A second 3-dose series of the hepatitis B vaccination is indicated in an individual who is non-immune after the first course. Completion of the vaccination is indicated in the individual who started the vaccination series, but did not complete all three doses.

In addition to receiving general counseling, the non-immune individual should be:

- assessed for HBV seroconversion at least 2 months after exposure
- be counseled on the signs and symptoms of hepatitis that may occur within 6 weeks to 6 months after exposure (eg. fatigue, loss of appetite, abdominal discomfort, jaundice, change in colour of urine and stool, rash, sore joints)

STEP 4b PEP MANAGEMENT - HCV EXPOSURE

There is no prophylactic treatment currently available for a person exposed to hepatitis C. Data do not support the use of immune globulin (IG) or antiviral agents, and thus these agents cannot be recommended.

The individual should be:

- tested for HCV antibody as soon as possible after exposure and, if negative, again at 3 and 6 months.
- test for HCV RNA at 4-6 weeks if earlier diagnosis of HCV infection is desired
- counseled on the risk of becoming infected (eg. transmission risk is estimated at 3-10%)
- counseled on the signs and symptoms of hepatitis that may occur within 6 weeks to 6 months after exposure (eg. fatigue, loss of appetite, abdominal discomfort, jaundice, change in colour of urine and stool, rash, sore joints)

STEP 4c PEP MANAGEMENT - HIV EXPOSURE

Management of a potential HIV exposure is dependent on the nature and risk of the exposure. PEP is not needed for exposure to stool, urine, tears, saliva, nasal secretions, vomitus, unless bloody. PEP may be needed (depending on type of exposure) if the source material is:

- blood, bloody fluid, semen or vaginal secretions,
- cerebrospinal, synovial, pleural, peritoneal, pericardial, or amniotic fluids
- tissue
- an instrument contaminated with one of the above substances

Management of HIV Exposure Based on Occupational Exposure and Source

TYPE OF EXPOSURE	SOURCE INDIVIDUAL				
	HIV Negative	HIV Positive			HIV status Unknown
		Lower titre exposure e.g., asymptomatic HIV infection and low viral load count* (i.e.<1500 copies.mL) **± history of HIV medication exposure**	**Higher titre exposure** e.g., advanced AIDS, primary HIV infection/ acute seroconversion, high or increasing viral load or low CD4 count* **and source has not or is not currently taking HIV medication**	**Higher titre exposure and source has taken or is currently taking HIV medication** The antiretroviral medication history of source patient should be obtained. If there is suspicion of resistance to one or more drugs in the PEP regimen, selection of alternate antiretrovirals should be done in consultation with an Infectious Disease physician. Initiation of PEP should not be delayed pending this consultation. Modifications can be made later.	
Intact Skin only	No PEP	No PEP	No PEP	No PEP	No PEP
Mucous membrane or nonintact skin exposure eg, chapped skin, dermatitis, abrasion, open wound					
with a small volume eg, few drops for short duration ie. less than several minutes	No PEP	No PEP or Consider Basic regimen	Basic regimen	Basic regimen **and** Consult ID	No PEP
with a large volume or major blood splash eg, several drops, major blood splash and/or longer duration ie. several minutes or more.	No PEP	Basic regimen	Expanded regimen	Expanded regimen **and** Consult ID	Consider Basic regimen (in settings where exposure to HIV-infected persons is likely)
Percutaneous/sharps exposure					
with solid needle or superficial injury eg, solid needle, superficial scratch	No PEP	Basic regimen	Expanded regimen	Expanded regimen **and** Consult ID	Consider Basic regimen (in settings where exposure to HIV-infected persons is likely)
With large-bore hollow needle or more severe injury eg, deep puncture, visible blood on device, or needle used in source patient's artery or vein. (The combination of these severity factors eg, large-bore hollow needle and deep puncture) contribute to an elevated risk for transmission if the source patient is HIV-positive.)	No PEP	Expanded regimen	Expanded regimen	Expanded regimen **and** Consult ID	Consider Basic regimen (in settings where exposure to HIV-infected persons is likely)

*Examples are used as surrogates to estimate the HIV titre in an exposure source for purposes of considering PEP regimens and do not reflect all clinical situations that may be observed. Although a high HIV titre in an exposure source has been associated with an increased risk for transmission, the possibility of transmission from a source with low HIV titre also must be considered.

Management of HIV Exposure Based on Non-Occupational Exposure and Source

	SOURCE	
	HIV POSITIVE	**HIV Status Unknown**
Negligible Exposure **Exposure** of vagina, rectum, eye, mouth, or other mucous membrane, intact or nonintact skin, or percutaneous contact **With** urine, nasal secretions, saliva, sweat, or tears if not visibly contaminated with blood **Regardless** of the known or suspected HIV status of the source	No PEP	No PEP
Substantial Exposure, >72 hours since exposure **Exposure** of vagina, rectum, eye, mouth, or other mucous membrane, nonintact skin, or percutaneous contact **With** blood, semen, vaginal secretions, rectal secretions, breast milk, or any body fluid that is visibly contaminated with blood **When** the source is known to be HIV-infected	Case-by-case determination	No PEP
Substantial Exposure, ≤72 hours since exposure **Exposure** of vagina, rectum, eye, mouth, or other mucous membrane, nonintact skin, or percutaneous contact **With** blood, semen, vaginal secretions, rectal secretions, breast milk, or any body fluid that is visibly contaminated with blood **When** the source is known to be HIV-infected	PEP Expanded Regimen	Case-by-case determination

HIV Post Exposure Prophylaxis Drug Regimens

Retrospective case-control data suggests that post-exposure use of zidovudine reduces the risk of HIV transmission by 79%. Use of combination antiretrovirals may further reduce the risk of infection. If the source is found to be negative, PEP should be discontinued.

The Basic regimen consists of:

- **Truvada** (tenofovir 300mg/emtricitabine 200mg) **1 tablet once daily**
  - Dose based on adequate renal function (CrCl ≥ 50ml/min)
  - Truvada side effects include nausea, headache, diarrhea, fatigue, acute renal failure (rare)

The Expanded regimen consists of:

- **Truvada** (tenofovir 300mg/emtricitabine 200mg) **1 tablet once daily**
  - Dose based on adequate renal function (CrCl ≥ 50ml/min)
  - Truvada side effects include nausea, headache, diarrhea, fatigue

  PLUS
- **Kaletra** tablets (lopinavir/ritonavir 200/50mg) **4 tablets once daily**
  - Kaletra side effects include diarrhea, nausea, asthenia, abdominal pain, ↑ lipids, ↑ LFTs

Other "expanded regimens" that could be considered include:

- **Truvada 1 tablet once daily + Atazanavir 300 mg once daily + Ritonavir 100 mg daily**
- **Truvada 1 tablet once daily + Darunavir 800 mg once daily + Ritonavir 100mg daily**
- **Truvada 1 tablet once daily + raltegravir 400 mg twice daily**

If available, the source-person should be interviewed for his/her history of antiretroviral medication use to help avoid prescribing medications to which the virus is likely to be resistant. If the source patient is HIV positive and has been on antiretroviral therapy, start the recommended expanded regimen and consult the Infectious Disease/HIV service. Initiation of PEP should not be delayed pending this consultation. Modifications can be made later.

An initial supply of medications (5 days) will be provided by CHSS or ED. **If deemed necessary, therapy should be continued for 28 days** and a prescription will be provided to the individual in follow-up.

Descriptions, Cautions and Contraindications for Using Truvada or Kaletra

Careful consideration should be made to drug interactions when using antiretrovirals with other medications, especially those that may compromise the activity of HIV medications and those that may be affected by the antiretrovirals.

Truvada

Emtricitabine and tenofovir are primarily excreted by the kidneys by a combination of glomerular filtration and active tubular secretion. Since emtricitabine and tenofovir are primarily eliminated by the kidneys, coadministration of Truvada with drugs that reduce renal function or compete for active tubular secretion may increase serum concentrations of emtricitabine, tenofovir, and/or other renally eliminated drugs.

Contraindicated	Use with Caution	
• Patients with severe renal insufficiency (creatinine clearance of <30mL/min, including patients requiring hemodialysis)	• Patients with renal insufficiency (dose adjustment required)	
	Antiretrovirals	didanosine atazanavir (without ritonavir)

Kaletra

Kaletra is a substrate and potent inhibitor of the P450 isoform CYP3A enzyme. Caution should be used when co-administering Kaletra and CYP3A4 enzyme inducers, inhibitors, or substrates with narrow therapeutic indices. If uncertain, please contact an ID/HIV specialist or pharmacist. The chart below lists some of the major drug interactions identified; other drug interactions may exist.

Contraindicated		Use with Caution	
		• Patients with severe hepatic impairment	
α-1 antagonist	alfuzosin	Antiarrhythmics	amiodarone bepridil flecainide lidocaine (systemic) propafenone quinidine
Antibiotic	fusidic acid		
Antihistamines	astemizole terfenadine		
Antimycobacterial	rifampin	Antibiotics	clarithromycin rifabutin
Ergot derivatives	dihydroergotamine ergonovine ergotamine methylergonovine	Anticoagulants	warfarin
GI motility agents	cisapride	Anticonvulsants	carbamazepine phenobarbital phenytoin
Herbal products	St. John's Wort (Hypericum perforatum)	Antifungals	Itraconzole >200mg/d ketoconazole voriconazole
HMG-CoA Reductase Inhibitors	lovastatin simvastatin	Calcium channel blockers	amlodipine felodipine nifedipine
Long acting beta-agonist	salmeterol	Cardiotonic glycoside	digoxin
Neuroleptic	pimozide	Corticosteroids (systemic and inhaled)	dexamethasone fluticasone
Sedative/hypnotics	midazolam triazolam	Immunosuppressants	cyclosporine tacrolimus rapamycin
PDE5 inhibitors	sildenafil (contraindicated when used for pulmonary hypertension) vardenafil	PDE5 inhibitors	sildenafil tadalafil
		Oral/Patch contraceptive	norethindrone ethinyl estradiol
		Narcotic analgesic	fentanyl methadone
		HMG-CoA Reductase Inhibitors	atorvastatin or rosuvastatin >10mg/d
		Psychotropics	citalopram quetiapine sertraline trazadone

STEP 5 FOLLOW -UP

General

- If the source is known, suspected or found to be positive for HBsAg, HCV Ab, and/or HIV Ab, the individual should not:
  - donate blood, semen, tissues, or organs
  - have unprotected sexual intercourse
  - share razors or toothbrushes
  - breastfeed (only if source may be HIV positive)
- All patients started on PEP should be referred to the Positive Care Clinic (416-864-5696)
- If started on PEP, the patient should receive additional baseline bloodwork including CBC, creatinine, ALT

HBV exposure follow-up testing and counseling

- 8 weeks - HBV serology if vaccinated post-exposure
- counsel regarding signs and symptoms of hepatitis that may occur within 6 weeks to 6 months after exposure (eg. fatigue, loss of appetite, abdominal discomfort, jaundice, change in colour of urine and stool, rash, sore joints)

HCV exposure follow-up testing and counseling

- 3 and 6 months - HCV serology, ALT
- test for HCV RNA at 4-6 weeks if earlier diagnosis of HCV infection is desired
- counsel regarding signs and symptoms of hepatitis that may occur within 6 weeks to 6 months after exposure (eg. fatigue, loss of appetite, abdominal discomfort, jaundice, change in colour of urine and stool, rash, sore joints)

HIV exposure follow-up testing and counseling

- 6 weeks, 3 months, 6 months (and 12 months only if HCV conversion occurs) - HIV serology
- Counsel regarding signs and symptoms of HIV infection that may occur within 2-14 weeks after exposure (eg. "flu-like" symptoms, weight loss, skin rash, fever, lymphadenopathy, fatigue)
- If PEP was provided, monitor for drug toxicity at 2 weeks (CBC, creatinine, ALT)

STI follow-up testing

- gonorrhea, chlamydia (urine, rectal, throat) depending on exposure
- syphilis serology at 6 weeks
- consider eligibility for hepatitis A vaccination as a sexual health promotion intervention

References

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Content and design prepared by St.Michael's Hospital Positive Care Clinic and Medical Media.
Printed with the assistance of an unrestricted educational grant from Abbott Laboratories.

Form No. 72090 Dev. 06/2011 Rev. 12/2012 V1